FOREST PEST CONDITIONS IN CALIFORNIA-1975

A PUBLICATION OF
THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL

THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL was founded in 1951. Its membership is open to public and private forest managers, foresters, entomologists, pathologists, zoologists, and others interested in the protection of forests from damage caused by animals, insects, and diseases. Its objective is to establish, maintain, and improve communication among individuals -- managers, administrators, and researchers -- who are concerned with these problems. This objective is accomplished by four actions:

1. Coordination of detection reporting and compilation of pest damage information.

2. Evaluation of pest conditions.

3. Pest control recommendations made to forest managing agencies and owners.

4. Review of policy, legal, and research aspects of forest pest control, and submission of recommendations thereon to appropriate authorities.

The State Board of Forestry recognizes the Council as an advisory body in forest pest protection. The Council is a participating member in the Western Forest Pest Committee of the Western Forestry and Conservation Association.

THIS REPORT, FOREST PEST CONDITIONS IN CALIFORNIA - 1975, is compiled for public and private forest land managers to keep them informed of pest conditions on forested land in California, and as an historical record of pest trends and occurrences. The report is based largely on information provided by the Statewide Cooperative Forest Pest Detection Survey; in 1975, 285 reports were received: 150 for insect pests, 60 for diseases, and 75 for animal pests.

The report was prepared by the Forest Service in cooperation with other member organizations of the Council. It was duplicated and distributed by the California Division of Forestry.

THE COVER. Porcupines continued to be a major cause of damage to pines in natural stands and plantations in California. Where damage was most severe, shooting, trapping, strychnine salt blocks, and transplanted fishers were used to control the pests.

Sacramento January 1976

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HIGHLIGHTS OF PEST CONDITIONS — 1975

STATUS OF INSECT PESTS. The large Modoc budworm infestation, first reported in 1973, declined in 1975 as expected. Several other forest insect pests, however, enlarged or intensified their infestations. The white fir sawfly caused conspicuous defoliation in some 70 centers, and white fir needle miner severely defoliated trees around Manzanita Mountain in Modoc County. The Jeffrey pine needle miner enlarged its area of activity in southern California.

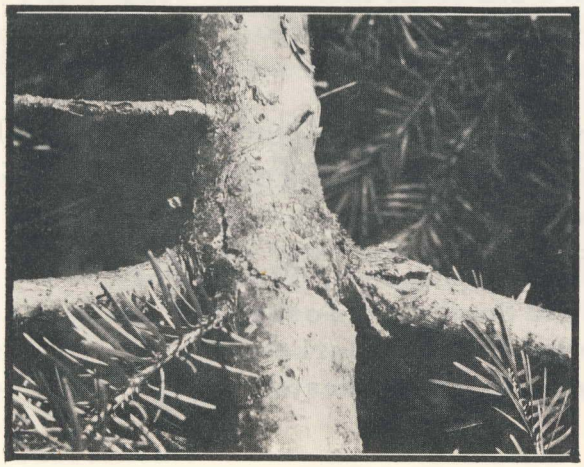
Bark beetles and cambium borers tended to be more aggressive also. Outbreaks of the fir flatheaded borer, western pine beetle, and mountain pine beetle were the most notable examples.

STATUS OF DISEASES. Four million Douglas-fir seedlings were killed by a foliage disease in the Humboldt Nursery; above-normal precipitation during the winter of 1974-75 prevented the application of fungicides for control.

A stem canker contributed to the deaths of many Douglas-fir in the northwestern part of the State, and smog damage to pines continued to increase in southern California and in Sierra Nevada forests.

Dutch elm disease was discovered for the first time in California in Sonoma, Napa, and Santa Clara Counties.

STATUS OF ANIMAL PESTS. Pocket gopher and porcupine damage to coniferous plantations generally increased in the northern inland forests and in the Sierra Nevada. Deer browsing damage was generally static at a moderate to high level in most of the timber-producing regions.



MORTALITY OF DOUGLAS-FIR. An unknown canker disease -- perhaps Dermea pseudotsugae or a Phomopsis species -- contributed to the deaths of many Douglas-firs in Del Norte, Siskiyou, Humboldt, and Trinity Counties. Fir flatheaded borers were involved in the mortality also.

STATUS AND CONTROL OF INSECT PESTS

BUDWORMS, Choristoneura spp. Populations of budworms in the Modoc infestation -- including the Modoc budworm (C. viridis) on white fir, and the sugar pine tortrix (C. lambertiana) on pines -- declined sharply as expected. Only light defoliation was detected from the air on 12,800 acres of white fir and on 6,400 acres of pine, down from 143,000 and 17,000 acres, respectively, in 1974.

The 1974 pilot test of Dylox for Modoc budworm control was a success, and Dylox was indicated to be effective and safe for suppressing the Modoc budworm. Evaluation of the effects of budworm-caused mortality, the effects of Dylox on non-target insects, fish, and mammals, and the benefits of suppression is continuing.

WHITE FIR NEEDLE MINER, Epinotia meritana. The white fir needle miner was one of several insects associated with the Modoc budworm on white fir, and was the only species involved whose populations increased in the infested area. Needle miners were abundant around Manzanita Mountain, Sweagert Flats, and Snell Springs in 1975. Some 8,000 acres of white fir previously damaged by the budworm lost much of their remaining foliage to needle miner feeding, and some tree mortality was expected. Evaluations of the outbreak are not yet complete.

LODGEPOLE NEEDLE MINER, Coleotechnites milleri. Populations of this persistent pest were high in Yosemite National Park, and probably will continue to increase, judging from weather conditions favorable to the insects during the critical egg deposition period. Population estimates in 1975 rose to the highest level since the peak of the previous epidemic in 1961. Extensive defoliation was present north and east of Tuolumne Meadows, and a previously undetected infestation was reported from Big Arroyo in Sequoia and Kings Canyon National Parks.

While trees in campgrounds and developed areas were not immediately threatened, trees began to die in remote Lyell and Virginia Canyons as a result of the current epidemic, suggesting that tree mortality might begin in campgrounds elsewhere.

WHITE FIR SAWFLY, Neodiprion abietis. Outbreaks of the white fir sawfly have been unusually prevalent in California fir forests in recent years. Since 1969, many locations defoliated by the pest have been reported, and several infestations were examined by entomologists. Typically, defoliation occurred in numerous localized sites scattered

over large areas. Damage in these infestations usually subsided after one year of defoliation, but in some cases the infestation persisted in the same location for two or more years. Frequently, the defoliation would cease in one area, but neighboring or entirely new locations were attacked the following year, causing a persistent but shifting pattern of pest activity.

Defoliation was widespread in 1971 and 1972, and in 1975 some 70 infestation centers of about 40,000 acres were mapped by aerial reconnaissance. The largest and most numerous infestations were found around Pilot Peak in Plumas County and French Meadow Reservoir in Placer County. Defoliation was mapped as far south as the Tuolumne River, and an unknown number of lightly defoliated areas were not visible from the air and went unrecorded.

DOUGLAS-FIR TUSSOCK MOTH, Orgyia pseudotsugata. Douglas-fir tussock moth populations have remained at endemic levels since the last outbreak of 1970 to 1973. The pheromone of this moth has been synthesized, and the California Region of the Forest Service has initiated a tussock moth trapping program as part of a west-wide effort to monitor populations of this important forest pest (the expanded USDA Research and Development Program for Douglas-fir Tussock Moth).

In 1975, pheromone traps were deployed in 105 locations around the State, and moths were found at almost all of the sites. No valid conclusions about population levels could be drawn from this survey, as trapping criteria were yet to be developed; however, it was evident that tussock moths were present in nearly all zones suitable to their biology.

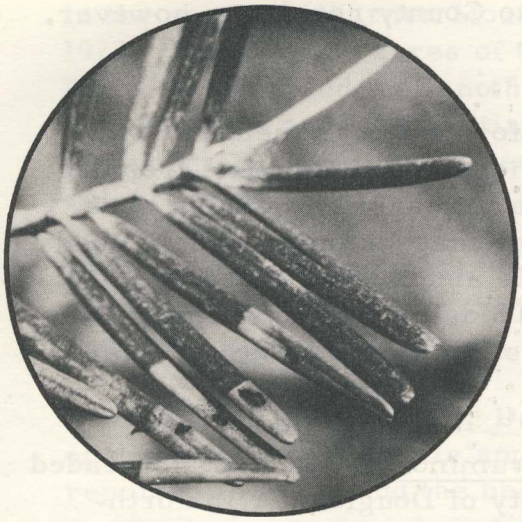
The University of California is participating in the Research and Development Program also, and is working principally in population assessment and biological control.

JEFFREY PINE NEEDLE MINER, Coleotechnites sp. near milleri. A persistent infestation of this needle miner continued to spread in the San Bernardino Mountains of southern California (San Bernardino County). A 1975 survey recorded 3,270 acres of trees infested, an enlargement of about one-third over the area reported in 1974.

Evaluations continued on the effects of needle miner attacks; first indications were that the impact on tree growth and vigor was less than would be expected from the appearance of defoliated trees.

FRUIT TREE LEAF ROLLER, Archips argyrospilus. The fruit tree leaf roller defoliated California black oak stands on some 14,500 acres near Lake Arrowhead in San Bernardino County. This epidemic

WHITE FIR NEEDLE MINER

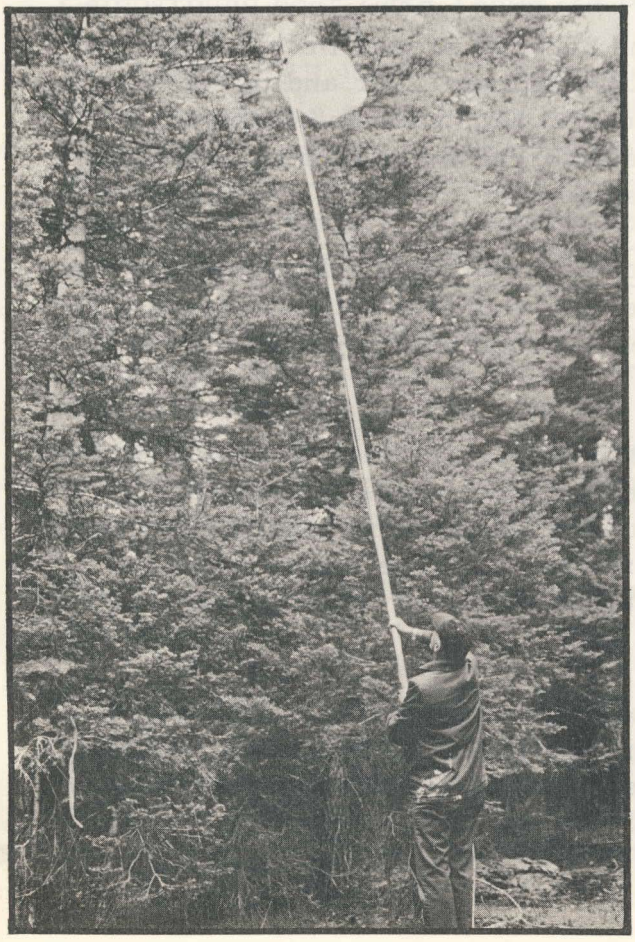


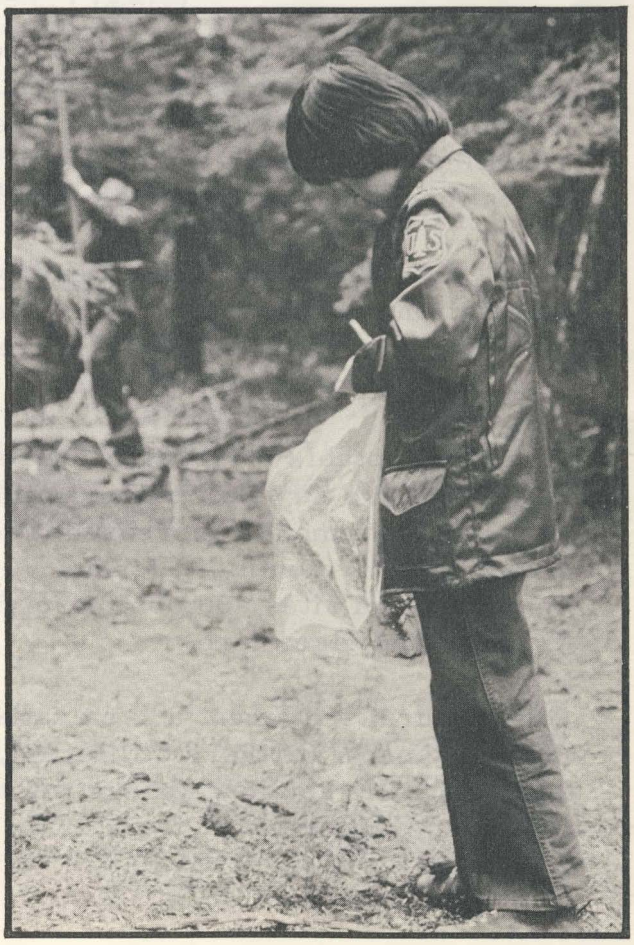
EVALUATING THE NEEDLE MINER OUTBREAK. Forest Service and California Division of Forestry entomologists participated jointly in evaluating the extent and intensity of the outbreak in Modoc County.

Needle miners attacked white firs which had already been damaged by Modoc budworms during 1973 and 1974. White firs on some 8,000 acres lost much of their remaining foliage to the needle miners, and some trees were expected to die.

Left: damage to white fir needles caused by the white fir needle miner, Epinotia meritana.

SAMPLING POPULATIONS AND ASSESSING DAMAGE OF THE NEEDLE MINER. Extensive field collection of needle miner larvae is necessary in order to determine the impact of the insects. Left, below, a California Division of Forestry entomologist uses a pole pruner to sample branches, while, right, a Forest Service entomologist labels and bags the samples for later analysis.





developed over the past three years and the outbreak may have run its course. The massive defoliation and the nuisance of the disagreeable abundance of insects were of great concern to County residents; however, no appreciable tree mortality was expected.

GYPSY MOTH, Porthetria dispar. The California Department of Food and Agriculture continued quarantine inspections and pheromone trapping to detect the entry of this pest into California. Nearly 100 entries have been detected so far -- these were usually egg masses on household goods and trailers from infested states. Adult male moths were trapped at Berkeley in 1973 and at Yosemite in 1974. To date, all known importations have been eradicated and no active infestations are known or suspected to exist in the State.

FIR FLATHEADED BORERS, Melanophila drummondi. The fir flatheaded borer was involved in the increasing mortality of Douglas-fir in northwestern California. The condition was first recognized in 1973, became more widespread in 1974, and increased to major proportions in 1975. Dying trees were found most often on poor sites. Although the fir flatheaded borer killed most of these trees, poor growing conditions and a canker disease were believed to contribute to the condition (see Status and Control of Diseases).

Dying trees were dispersed over some 200-300 square miles. The most conspicuous losses occurred in the Salmon River and in the South Fork of the Trinity Rivers regions in Humboldt and Siskiyou Counties. A planned evaluation of the outbreak included an assessment of its magnitude using aerial photography.

WESTERN PINE BEETLE, Dendroctonus brevicomis. Reported infestations of the western pine beetle indicated that activity increased in 1975. In some localities the beetles reached high population levels and killed large groups of trees.

The most notable outbreak occurred at Glenburn in Shasta County, where beetle attacks severely reduced ponderosa pine stands in a home-and-ranch environment. Increased tree killing was evident also in the Hat Creek country south of Glenburn. Some serious tree losses occurred in recreation sites and commercial stands in Modoc County, San Diego County, and elsewhere.

Silvicultural treatment and salvage logging were used to suppress active infestations in northern California, and silvicultural treatment, salvage logging, and chemical sprays were used in the recreation forests of southern California.

MOUNTAIN PINE BEETLE, Dendroctonus ponderosa. An outbreak of the mountain pine beetle in lodgepole pine stands, reported in 1974 in the southern Warner Mountains of Modoc County, continued during 1975. Some 3,400 acres of trees were affected at Skunk Cabbage Creek. Records indicated that another outbreak occurred in this same area between 1955 and 1964; initial surveys of losses and bark beetle risk in the affected stands suggested that another persistent outbreak might develop.

Elsewhere, mountain pine beetle activity was about normal; however, expanding infestations were reported in other parts of Modoc County, and in Siskiyou, El Dorado, and Fresno Counties.

DOUGLAS-FIR BEETLE, Dendroctonus pseudotsugae. Populations of the Douglas-fir beetle appeared to be at a low ebb; no outbreaks were reported in 1975, and the beetle was not involved in the Douglas-fir mortality in northwestern California. Entomologists had difficulty finding beetle broods in two windfall areas checked to detect buildups.

JEFFREY PINE BEETLE, Dendroctonus jeffreyi. Above-normal activity continued on the Hat Creek and Bogard Districts of Lassen National Forest (Shasta and Lassen Counties) and at Fallen Leaf Campground near Lake Tahoe (El Dorado County).

FIR ENGRAVER BEETLE, Scolytus ventralis. Localized infestations were detected in a few localities, and in some cases tree killing was concentrated enough to permit suppression through salvage logging. The most important outbreaks occurred at Franklin Creek and Blue Lake, Modoc County; Goosenest, Siskiyou County; Squaw Peak, Plumas County; and Piute Mountain, Kern County.

PINE ENGRAVER BEETLES, Ips spp. A remarkably rapid buildup occurred at the Sugarloaf Picnic Area on the Lassen National Forest, Shasta County; the beetles attacked ponderosa pines damaged by the Cave Fire of July 3, 1975. The infestation was not expected to persist or spread much beyond the fire-damaged trees, as the soil moisture was adequate to maintain the vigor of undamaged trees.

Other reports suggested that normal activity prevailed elsewhere in the State.

SCALE INSECTS. Several reports were received in 1975, but the incidence and damage of these insects appeared to have diminished greatly from previous years. Important scale infestations included the black pine leaf-scale, Nuculaspis californica, the pine needle scale, Chionaspis pinifoliae, and the sugar pine matsucoccus scale, Matsucoccus paucicicatrices.

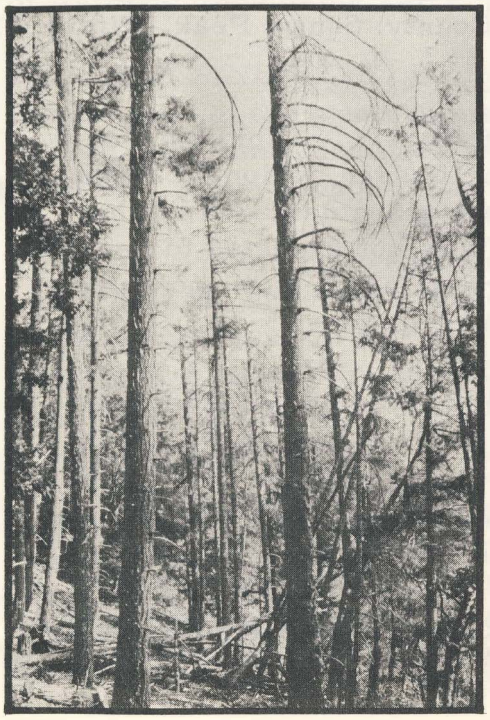
INSECTS DAMAGING PLANTATIONS AND YOUNG TREES. The Western pine shoot moth, Eucosma sonomana, was found in 40 percent of the tips of Jeffrey pine surveyed in one location on the Tahoe National Forest near Truckee (Nevada County). The shoot moth is suspected to be an important cause of reduced growth of pines in eastern California and Oregon.

The survey was part of a field experiment to evaluate the effectiveness of four foliar-applied systemic insecticides for killing larvae that tunnel within the pith of pine tips. Post treatment examinations indicated that the applications were not effective.

The importation into California of the Nantucket pine tip moth, Rhyacionia frustrana, was discovered in 1971 with the detection of the pest in parts of San Diego, San Bernardino, and Kern Counties.

The boundaries of these infestations are not known to have expanded since 1974, but new spots within the boundaries were found. Information on the tip moth incidence is maintained by the San Diego County Pest Detection Grid Survey and State-wide nursery inspections. In California, the principal host was Monterey pine, and serious damage occurred to ornamental pines and to Christmas tree farms and nurseries.

The pine resin midge, Cecidomyia piniiopis, was reported damaging young pines; Douglas-fir gall midges, Contarinia spp., remained active in small Douglas-fir in a few locations.



MORTALITY OF DOUGLAS-FIR. Dead and dying Douglas-fir were found over some 200-300 square miles of forest in Humboldt and Siskiyou Counties. Although fir flatheaded borers killed most of these trees, poor growing conditions and an unknown canker disease contributed to the widespread and increasing mortality.

TABLE I

INSECT CONTROL ACTIONS RECOMMENDED BY THE COUNCIL - 1975

INFESTATION AREA	ACREAGE (EST.)	COUNTY	INSECT	HOST	RECOMMENDED ACTION
NORTHERN CALIFORNIA COMMERCIAL AND RECREATIONAL FORESTS					
BARK BEETLES					
Glenburn	3,500	Shasta	Db, Nc	PP	Control and salvage
McCloud Flats	7,000	Siskiyou	Db	PP	Salvage, thin, and research
Northwest California	200,000	Siskiyou	Md	DF	Evaluate and Salvage
Warner Mts.	3,400	Modoc	Dm	LP	Evaluate
DEFOLIATORS					
Highway 89	1,000	Siskiyou	Zh	PP	Evaluate
Northern California	40,000	Northern California	Na	WF, RF	Evaluate and surveillance
Manzanita Mtn.	8,000	Modoc	Em	WF	Evaluate
Statewide	--	--	Gm	O	Surveillance
PLANTATIONS AND EXPERIMENTAL AREAS					
East Side Plantation	unknown	Northern California	Eu	PP	Survey and research
Established Seed Orchards	100	Northern California	Da, Rz, Zh	PP	Spray grafted trees five times a year
Plantations	--	Statewide	Rf, Cp, Gh	Hard pines	Surveillance and research
STATE AND NATIONAL PARKS					
Lassen Volcanic National Park	3,000	Shasta and Lassen	Dj, Db, Dm	JP, PP, SP, LP	Surveillance
Sequoia and Kings Canyon Natl. Parks	2,500	Fresno, Tulare	Db, Dm, Dj	PP, SP, JP, LP	Maintenance control*
Yosemite National Park	1,200	Mariposa and Tuolumne	Db, Dm, Dj	PP, SP, JP, LP	Maintenance control
Yosemite National Park	100,000	Tuolumne	Cm	LP	Surveillance and research
SOUTHERN CALIFORNIA RECREATION FORESTS					
Arrowhead-Crestline	47,000	San Bernardino	Dm, Db, Ips, Dj	PP, CP, JP	Sanitation and maintenance control
Arroyo-Seco District	3,000	Los Angeles	Db, Ips, Mc	PP, CP, JP	Surveillance
Big Bear Valley	8,800	San Bernardino	Dj, Ips, McSv	JP, WF	Sanitation and maintenance control
Idyllwild-San Jacinto	37,000	Riverside	Mc, Db, Ips, Dm	PP, CP, JP	Sanitation and maintenance control
Laguna Mtn.	9,700	San Diego	Db, Mc	CP, JP	Maintenance control
Lost Valley	4,000	San Diego	Db, Ips	CP	Maintenance control
Mt. Baldy District	1,500	Los Angeles	Ips, Dj, Dm, Mc	PP, JP, CP	Surveillance
Mt. Pinos District	24,000	Ventura	Ma	Pe	Surveillance
Mt. Pinos District	7,900	Ventura and Kern	Mc, Ips	JP	Surveillance
Ranger Peak-Figueroa Mtn.	700	Santa Barbara	Db, Ips, Dv	PP, CP	Surveillance
San Gorgonio District	25,000	San Bernardino	Db, Dj, Ips	PP, JP, CP	Sanitation and maintenance control
Snow Valley-Big Bear-Santa Ana	3,000	San Bernardino	C sp.	JP	Surveillance and research
Valyermo District	14,600	Los Angeles	Mc, Ips	JP	Surveillance
Wrightwood	2,000	San Bernardino	Mc, Ips	JP	Maintenance control

ABBREVIATIONS

INSECTS

C sp. - Jeffrey pine needle miner	Dp - Douglas-fir beetle	Md - Fir flatheaded borer
Cm - Lodgepole needle miner	Eu - Eucosma	Na - White fir sawfly
Cp - Pine resin midge	Em - White fir needle miner	Nc - Black pine leaf scale
Da - Fir coneworm	Gm - Gypsy moth	Rf - Nantucket pine tip moth
Db - Western pine beetle	Gh - Grasshoppers	Rz - Ponderosa pine tip moth
Dj - Jeffrey pine beetle	Ips - Pine ips	Sv - Fir engraver
Dm - Mountain pine beetle	Mc - California flatheaded borer	Zh - Needle-sheath miner

HOST

CP - Coulter pine	Pe - Pinyon pine
DF - Douglas-fir	PP - Ponderosa pine
JP - Jeffrey pine	RF - Red fir
LP - Lodgepole pine	SP - Sugar pine
O - Oaks	WF - White fir

* Maintenance control is defined as suppression measures applied continually or annually (seasonally) in an effort to keep tree losses at a tolerable level. Suppression measures may include logging, wood cutting, felling and burning or insecticide application on infested trees. Based on the Council's 1971 resolution, it is recommended that chemicals be used only when non-insecticidal alternatives of suppression are not suitable.

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SALT DAMAGE. A biological evaluation of roadside conifer damage in San Bernardino County determined that most of the damage was caused by highway deicing salt. Damage was concentrated along Highway 38 from Camp Angeles to Onyx Summit, with scattered damage throughout the San Bernardino National Forest where highway deicing salt was used.

WHITE PINE BLISTER RUST. Two new rust infection centers were reported in Tulare County: at Surprise Grove in Sequoia National Park, and nearby in Case Mountain Grove on Salt Creek Ridge.

ROOT ROTS. Three major root-rotting organisms -- Fomes annosus, Armillaria mellea, and Verticicladiella wagenerii -- continued to cause mortality and windthrow in various parts of the State.

Fomes annosus killed about 100 madrone trees (Arbutus menziesii) in three centers in Placer County; this was believed to be the first report of F. annosus in madrone.

NURSERY DISEASES. Douglas-fir sown in 1974 suffered severe losses in the Humboldt Nursery, Humboldt County. Approximately 4,000,000 seedlings were killed by a Phoma sp., a fungus that completely defoliates seedlings. Some of the trees that survived the Phoma attack were then infected by Phomopsis lokoyae, which caused additional losses. Sirococcus strobilinus caused losses in 1-0 and 2-0 Jeffrey pine, and in 1 0 ponderosa pine.

In a fumigation plot at the Placerville Nursery, Eldorado County, Fusarium oxysporum caused major losses in sugar pine, and minor losses in Douglas-fir and in red and white fir. Elsewhere in the nursery, a Phytophthora sp. caused small losses in sugar pine.

SURVEYS

PEST DAMAGE INVENTORY. Although no field work was done in 1975, the Forest Service continued the analysis of the data that were collected in 1972, 1973, and 1974. The results of the 1973 survey will be published in 1976, and will be followed by a report of the three years' results.

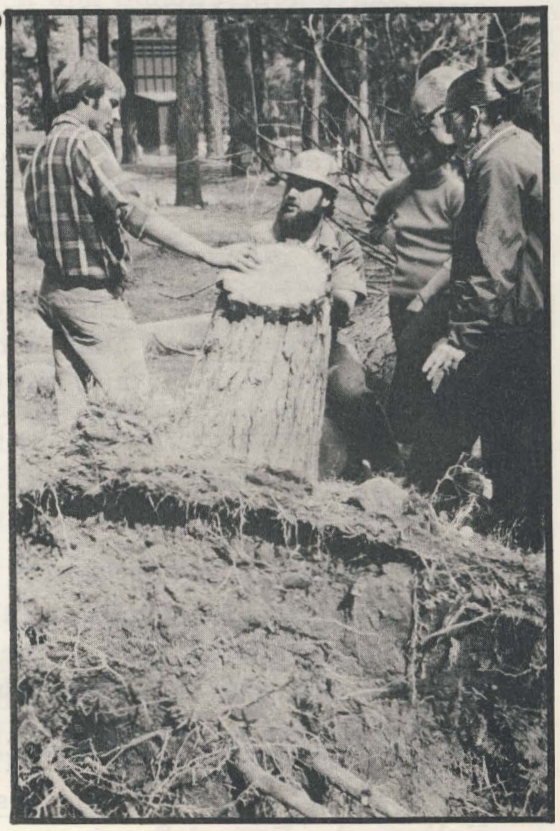
FOMES ANNOSUS IN YOSEMITE VALLEY. In order to develop a risk rating for Fomes annosus-infected incense-cedar in Yosemite Valley, the Forest Service and University of California pathologists rated and photographed the crowns of 38 trees, and then uprooted the trees to measure the root decay. They photographed the roots, and delineated the extent of decay on the photos. The purpose of the survey was to use crown condition to predict the potential of a tree to windthrow; the Forest Service will publish the results in 1976.

ANNOSUS ROOT ROT IN YOSEMITE

A

B

C



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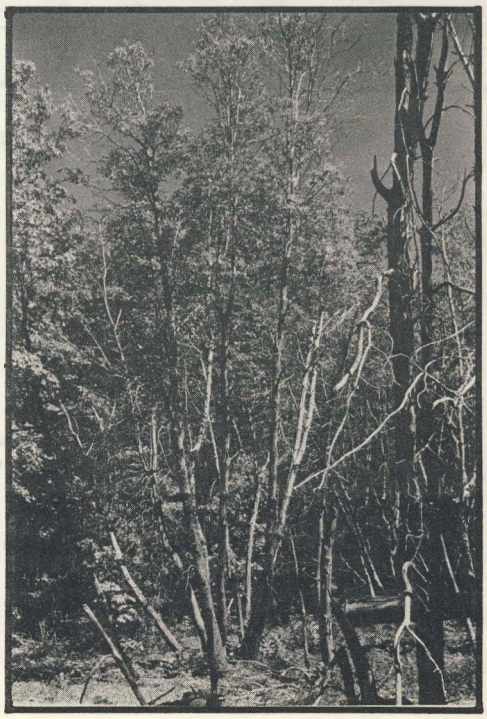
RISK-RATING FOMES ANNOSUS-INFECTED INCENSE-CEDARS. University of California and Forest Service plant pathologists and National Park Service personnel examine the roots of declining incense-cedars in Yosemite Valley. (A) Rigging a fading cedar preparatory to pulling it over; (B) a topped tree being uprooted; (C) an uprooted cedar with much of its supporting root system rotted; (D) Forest Service plant pathologist explains to Park visitors the symptoms and implications of annosus root rot.

FOMES ANNOSUS IN EASTSIDE PINE. Field work was completed on the Fomes annosus survey conducted in the eastside pine type on the Modoc National Forest, Modoc County. This data, combined with 1973 and 1974 data, will be used to develop recommendations for managing timber in stands infected with the disease.

DWARF MISTLETOE IN CAMPGROUNDS. In 1973 and 1974, the Forest Service surveyed campgrounds throughout California to determine the mortality rates of dwarf mistletoe-infected pines. Field crews set up plots at Laguna Campground in the Cleveland National Forest, at Nevada Beach in the Lake Tahoe Basin Management Unit, and at Merrill, Cave, and Bridge Campgrounds in the Lassen National Forest. Each year as trees die and are removed from the campgrounds, local foresters report to the Forest Pest Control Staff the cause of death and age of each dead tree.

Tree mortality has been most notable at Laguna Campground. Within the original 973-tree plot, 277 trees (29%) were uninfected. Since 1973, 21 pines have died: of these, only one was uninfected and 17 were infected throughout one-half or more of the crown.

A provisional assessment of impact will be made as soon as sufficient data are available, perhaps in 1976. Management guidelines reflecting that impact will be developed at the same time, and the impact assessment will be refined as further data are produced. Final results are expected within 5 to 10 years.



FOMES ANNOSUS IN MADRONE. Annosus root rot was found to have killed some 100 madrone trees in three centers in Placer County. This was believed to be the first discovery of F. annosus in madrone.

TABLE II

FOREST DISEASES REPORTED - 1975

CAUSAL AGENT	HOST	COUNTY
RUSTS		
White pine blister rust	SP	Placer
	SP	Tulare (2)
Needle rust	WF	Plumas (2)
Melampsorella occidentalis	BC	Siskiyou
STEM DISEASES		
Cytospora abietis	WF, RF	Lassen (6)
	WF	Plumas
Dermea pseudotsugae	DF	Siskiyou (3)
	DF	Del Norte
	DF	Humboldt
	DF	Trinity
FOLIAGE DISEASES		
Lophodermella arcuata	SP	Tuolumne
	SP	Placer
Lophodermium durilabrum	FP	Siskiyou
MISTLETOES		
Dwarf mistletoe	DF	Siskiyou
ROOT DISEASES		
Fomes annosus	Mad	Placer
	JP	Lassen
Verticicladiella wagenerii	PP	Shasta
STEM DECAYS		
Polyporus leucospongia	FP	Siskiyou
NURSERY DISEASES		
Phoma sp.	DF	Humboldt
Phomopsis lokoyae	DF	Humboldt
Sirococcus strobilinus	JP, PP	Humboldt
Fusarium oxysporum	SP, DF	
	RF, WF	Placer
Phytophthora sp.	SP	Placer

HOST ABBREVIATIONS

AC	Atlantic cedar	CRw	Coast redwood	JP	Jeffrey pine	Rho	Rhododendron
AP	Allepo pine	DC	Deodar cedar	KP	Knobcone pine	RF	Red fir
BC	Black cottonwood	DF	Douglas-fir	LP	Lodgepole pine	Seq	Giant sequoia
BcDF	Big-cone Douglas-fir	FP	Foxtail pine	Mad	Madrone	SP	Sugar pine
CL	California laurel	IC	Incense-cedar	PP	Ponderosa pine	Syc	Sycamore
CP	Coulter pine					WF	White fir

KNOW YOUR FOREST DISEASES

CYTOSPORA CANKER OF TRUE FIRS

Cytospora abietis is a parasitic fungus that causes cankers and dieback of true firs (Abies) in the western United States. In California, white fir, A. concolor, and red fir, A. magnifica, are the species most commonly attacked and damaged by the fungus. Other species of true fir and Douglas-fir, Pseudotsuga menziesii, are occasional hosts for this organism, but damage on these species is usually scattered and slight.

Cytospora attacks trees of all ages. Branch and top killing are very common, and small seedlings and saplings are often girdled and killed.

THE FUNGUS. C. abietis is the imperfect stage of the fungus Valsa abietis. The perfect stage occurs in Europe, but has been reported only once in North America, on Thuja occidentalis in Iowa.

Development of the fruiting bodies takes place in the dead bark tissues. Spore production occurs in spring and summer, usually during periods of rain or high moisture.

Infection is by spores produced from the fruiting bodies imbedded in the bark of an infected branch. The spores are waterborne and spread during rains. Possibly the spores also are transmitted by bark beetles and other insects. Infection takes place through wounds and other openings in living branch tissues. Following infection, the fungus grows into and kills the cambium and inner bark. Growth of the fungus is about twice as fast longitudinally along a branch as it is around the branch circumference. Thus, elongated cankers often are produced. Eventually, however, usually in about 6 months to 2 years, the fungus girdles and kills most branches. Large branches and trunks are girdled more slowly.

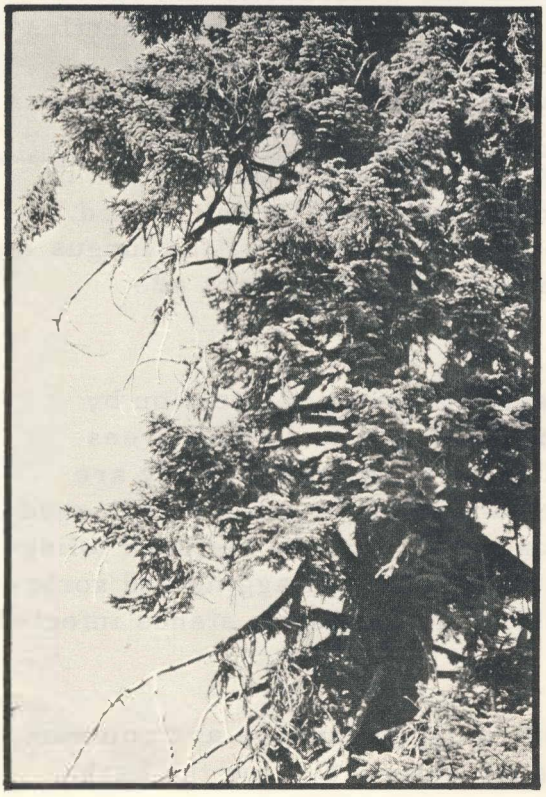
SYMPTOMS AND SIGNS. The most notable symptom of infection by Cytospora is dieback or flagging of branches, tops, and small trees. Flags begin to appear in late spring and in early summer. They are brick red initially. Later in the summer and fall, the foliage of flagged branches turns light brown. For the most part, much of the dead foliage remains on flagged branches for at least a year after flagging and sometimes 2 to 3 years. Flagging is particularly noticeable in stands infected with dwarf mistletoe.

Cankers are often formed by this disease. Sunken cankers are common, but cankers showing little sunken tissues do occur. Cutting the bark

away from a suspected infection often will show the margin between living tissue and the canker. Some branches, usually small ones, are girdled and killed by the fungus with no canker development. In these cases where rapid killing of a branch or top occurs, the condition is commonly known as a "dieback." On small trees, infection of the trunk may occur through side branches. A dead branch or branch stub usually can be seen in the central region of a developing trunk canker.

Resin or "pitch" often is exuded by branches infected by Cytospora. Resin exudation usually appears near the margin of the living and dead tissues. Old infections, generally on large branches and trunks, show a noticeable amount of resin accumulation on the dead bark surfaces as well as near the canker margin. Small branches or seedlings killed quickly by Cytospora may show no resin exudation.

The fruiting bodies are small, blister-like structures imbedded in the bark of a dead branch or in the dead tissues of a canker. They are quite small and not easily discernible, but are quite abundant and give the bark on the portion of the branch where they occur a warty appearance. When fruting bodies mature, they produce spores in great abundance. These usually occur in "spore horns", which look like small, curly, yellow threads arising from the blisters and consist of many spores held together by a sticky material. When spore horns are wet, the spores are dispersed in the water.



CYTOSPORA CANKER IN TRUE FIRS. The dead branches in the mid-crown of this large red fir were initially infected by dwarf mistletoe, and later killed by Cytospora abietis.

PREDISPOSING FACTORS. Generally Cytospora is a weak parasite, but it can assume epidemic proportions when trees are injured, weakened, or predisposed to attack by adverse conditions. For example, in 1959-1960 and again in 1966 in some parts of California, trees were severly weakened by drought. Subsequently, the parasite intensified over several fairly large areas, and killed limbs, tops, and even rather large trees. The disease subsided during subsequent years when there was adequate rainfall. The dry years 1971 and 1972 caused an epidemic which is now resulting in extensive damage and some mortality in Lassen and Plumas Counties.

The increase in bark beetle populations, common during drought years, also may increase the incidence of this disease. Patch killing of bark by beetles and galleries produced by their larvae weaken branches and produce potential sites of infection. In addition, Cytospora-infected limbs may serve as entry courts for bark beetles.

Fire aids attacks by Cytospora. Scorching of branches and twigs from ground fires damages and weakens trees and predisposes them to attack. Buildup of this disease has been observed in certain areas after severe fire years.

Firs growing on poor sites are more susceptible to infection than are trees on good sites. For example, the disease is more common and severe on firs growing on the poorer, dry sites on the east slope of the Sierra Nevada crest than on the better, more moist sites of the western slope.

The cytospora canker disease can build up in small red fir trees left after logging; severity of buildup appears related to the degree of logging damage to the residual stand. Skinned and damaged tops and branches are prime sites for infection. Also, understory firs often suffer shock from overstory removal, presumably as a result of sudden exposure to direct sunlight and increased temperature.

Dwarf mistletoe (Arceuthobium abietinum), a serious parasite of true firs in California, also commonly predisposes both red and white fir to attack by Cytospora. Cytospora canker is commonly found on branches of red fir and white fir infected with dwarf mistletoe. Dwarf mistletoe swellings provide openings in the host bark for infection, and a favorable environment for growth and development of the fungus. In California, about 20 percent of the branches infected with dwarf mistletoe are invaded and eventually killed by Cytospora. As a result, the fungus exerts some biological control of dwarf mistletoe. But the reduction of a significant proportion of the living crown from branch dieback probably has a more adverse influence on tree growth than a favorable influence in reducing the amount of dwarf mistletoe.

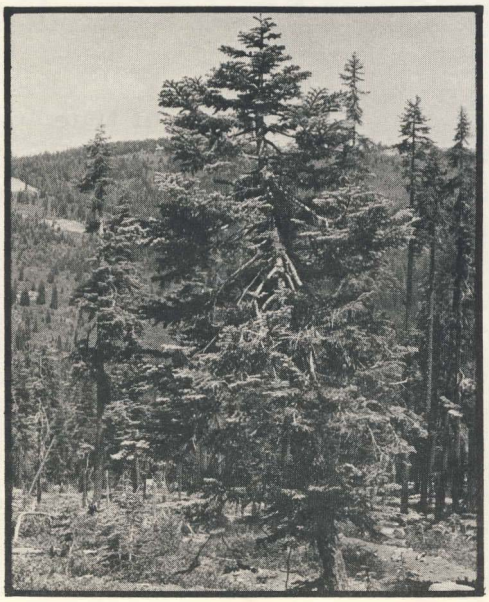
CONTROL. No direct control of cytospora canker is known, but certain measures can be undertaken in many instances to reduce damage from this disease. Avoid activities that will weaken or damage trees. Take all measures possible to reduce damage to residual trees during logging operations. Not only do open wounds provide entrance courts for infection, but the weakening of trees through scarring, root damage, and soil compaction also predisposes them to attack by Cytospora.

Avoid sudden exposure of understory true firs to strong light and high temperature. Weakening of trees from sudden exposure, plus wounds caused by logging, can lead to severe buildup of this disease.

Dwarf mistletoe is a primary factor predisposing trees to infection by this fungus. Removal of dwarf mistletoe-infected trees can reduce the buildup of both dwarf mistletoe and cytospora canker infection in surrounding trees.

Avoid planting true firs on poor sites or on sites not suitable for the species. Where a choice exists, remove infected trees in thinning operations.

On recreation sites and high use areas more intensive measures may be undertaken to control this disease. Prune and dispose of infected branches to reduce the chance of repeated infection and buildup so that branch infections will not grow into the trunk. High value trees may be watered during dry periods to avoid weakening from drought. Also, shading small trees--particularly recently planted or exposed ones--for 1 to 2 years will protect them from shock from intense light and high temperatures.



CYTOSPORA CANKER IN TRUE FIRS. Cytospora canker is killing many of the dwarf mistletoe-infected branches of this young red fir in Lassen County.

STATUS AND CONTROL OF ANIMAL PESTS

POCKET GOPHER. Pocket gophers continued to be a major problem in coniferous plantations in most of the timbered areas of the State, except the north coastal region. Tree species damaged included ponderosa, Jeffrey, sugar, and Monterey pines, Douglas fir, and white and red firs. Damage was reported as decreasing in Modoc County, and generally increasing in the Sierra Nevada and in the central coastal area south to Santa Barbara County. Baiting with the forest-land burrow builder was the chief control method employed, and increased use of this machine appears to be necessary where terrain and soil conditions are suitable.

PORCUPINE. Porcupine damage was widespread in the northern forests and in the Sierra Nevada south to Tuolumne County, with the most serious problems occurring in plantations. Damage was predominantly to ponderosa pine in both natural stands and plantations. There was extensive injury to Jeffrey pine on the Tahoe National Forest, and limited damage to sugar pine in Mendocino County and in the Sierra Nevada, to lodgepole pine in the Sierra Nevada, and to coastal redwood in Del Norte County. Except for a few locations in Modoc County and in the Sierra Nevada, porcupine damage increased in all regions.

Shooting, trapping, and strychnine salt blocks were utilized as controls in some locations. The California Department of Fish and Game transplanted fishers, which are large members of the weasel family that prey upon porcupines to the Big Bar and Weaverville areas of the Trinity National Forest, Siskiyou County.

DEER. Deer browsing of coniferous seedlings and saplings up to fifteen years of age occurred in natural stands and plantations in all the major timber producing areas of the State. As usual, the most extensive damage was to redwood and Douglas-fir in the north coastal region. Major damage also occurred in plantations of Douglas-fir in the central Sierra Nevada and in plantations of Monterey pine and Douglas-fir in the central coast region. Damage was generally static, but increased in some plantations in Mendocino County and in some natural stands in Butte and Plumas Counties. Control measures employed on a limited basis were vexar sleeves, repellents, and hunting.

MINOR PESTS. The animals listed on the following page caused damage in the counties noted. Damage was severe in some locations, but it was generally not widespread.

SPECIES	COUNTY
Birds	Del Norte, Eldorado
Black Bear	Humboldt, Del Norte, Placer
Dusky-Footed Wood Rat	Humboldt, Mendocino, Del Norte, Placer
Meadow Mouse	Siskiyou
Mountain Beaver	Humboldt, Del Norte, Eldorado
Rabbits	Del Norte, Plumas, Lassen, Los Angeles, Shasta, Trinity
Small Seed-Eating Mammals	Mendocino, Lake, Eldorado, Amador, Calaveras, Plumas, Lassen, Los Angeles
Tree Squirrels	Mendocino, Eldorado, Amador, Calaveras, Sierra, Nevada, Placer, Eldorado, Plumas, Lassen, Modoc, Santa Barbara
Feral Pigs	Mendocino
Ground Squirrels	Santa Barbara

STATEMENT AND RESOLUTIONS OF THE COUNCIL, NOVEMBER 5, 1975

STATEMENT NO. 1 -- To the Director, State Department of Food and Agriculture, indicating the willingness of the Council to provide technical information, advice, and assistance on Dutch elm disease and other similar urban forest pest problems.

A. Dutch elm disease is not a wildland forest disease problem in California, but could be considered an urban forestry problem. The California Forest Pest Control Action Council recognizes that we are obliged to deal with this and similar urban problems and will provide technical information on forest disease problems to control agencies upon request.

B. The Disease Committee includes individuals with skill and expertise in plant protection who are available to assist on Dutch elm disease and similar control problems that may arise in urban forestry.

RESOLUTION NO. 1 -- To the California Department of Transportation, urging a review of their environmental impact report relating to the application of salt to roads adjacent to forested areas.

Whereas decline and mortality of forest trees and shrubs are increasing in southern California Mountains adjacent to State highways, and

Whereas this damage has been determined by Forest Service Pathologists to be caused by chloride deposited in the soil as a result of the salting program, and

Whereas the Attorney General has recommended an environmental review of the salting program,

The California Forest Pest Control Action Council finds that the Environmental Impact Report of the California Department of Transportation for their road salting program is inadequate. The Council recommends re-evaluation of the Impact Report in the light of evidence for salt damage along California highways,

RESOLUTION NO. 2 -- To the Director, Pacific Southwest Forest and Range Experiment Station, urging that Dr. R. S. Smith, Jr., be returned from Hawaii to California to continue his program on the control of nursery diseases.

At a time when reforestation is a major concern of California Forest Managers, the Council is disturbed that one of the outstanding authorities on nursery diseases has been transferred from the State. We urge that Dr. R. S. Smith, Jr., be returned to California to continue his program on the control of nursery diseases.

RESOLUTION NO. 3 -- To the Chief of the Forest Service, and to the Regional Forester, Region Five, urging that the Pest Damage Inventory developed by the Forest Pest Control Staff in Region Five, be funded fully in 1976.

Sound management of pest problems in California forests requires firm knowledge of the impact of tree mortality, the causes of mortality, and the relationship of mortality to stand and site factors. The Pest Damage Inventory, recently tested by the Forest Service, Region Five, is designed to provide this needed knowledge.

The Council regrets that the Pest Damage Inventory was not funded in 1975, and urges the Forest Service to fund it fully in 1976.

RESOLUTION NO. 4 -- To the Western Forest Pest Committee, Western Forestry and Conservation Association, and to California Senators and Congressmen, urging that adequate funding be made available to the Fish and Wildlife Service and to the Forest Service for research on pocket gophers.

Whereas the pocket gopher represents a serious threat to forest regeneration on many portions of California's forest land, and

Whereas research on the control of pocket gophers has been successfully initiated by the Fish and Wildlife Service's Forest Animal Damage Control Research Project, and

Whereas the project has had serious funding setbacks,

The California Forest Pest Control Action Council recommends to the Fish and Wildlife Service, the Forest Service, and to other concerned organizations that adequate funding for research on pocket gophers be augmented as soon as possible.

RESOLUTION NO. 5 -- To the McLaughlin Gormley King Company, urging it to register Big Game Repellent (BGR) for use as an animal repellent to protect conifer seedlings in California.

Browsing by deer and elk annually damages forest regeneration extensively in California.

Repellents applied to seedlings in the past have caused skin irritation to workers handling the stock.

A material manufactured from putrefied eggs by McLaughlin Gormley King Company, called BGR (Big Game Repellent) shows promise as a non-toxic repellent. Although the material has been registered by the EPA in the States of Oregon and Washington for use on conifer seedlings as an animal repellent, it has not been registered for such use in California.

The California Forest Pest Control Action Council requests the McLaughlin Gormley King Company to register BGR for use as an animal repellent to protect conifer seedlings in California.

RESOLUTION NO. 6 -- To Governor Edmund G. Brown, Jr., and to Senators Alan Cranston and John Tunney, urging that they more rapidly implement and enforce legislation which will significantly abate air pollution damage to California agriculture and forests.

Whereas in 1974 the California Forest Pest Control Action Council unanimously passed a resolution requesting that the mayors of California ask their citizens to use mass transportation and develop such in order to help alleviate smog problems present in the California forests, and

Whereas the problem has not gone away: the specter of air pollution continued to detrimentally affect the forests adjacent to the San Joaquin, South Coast, San Diego, and Sacramento Air Basins during 1975, and

Whereas the estimated annual losses to agriculture in California due to smog are exceeding $200,000,000, and these losses in view of our present economics are unacceptable,

The California Forest Pest Control Action Council strongly urges Governor Edmund G. Brown, Jr., and Senators Alan Cranston and John Tunney to more rapidly implement and enforce legislation which will significantly abate air pollution damage to California agriculture and forests.

USDA - FOREST SERVICE

FOREST PEST DETECTION REPORT

I. FIELD INFORMATION *(See instructions on reverse)*

A

1. COUNTY
2. FOREST (FS ONLY)
3. DISTRICT (FS ONLY)
4. T._____ R._____ S._____
5. DATE:
6. LOCATION:
5. LAND OWNERSHIP:
   1. FOREST SERVICE ☐
   2. OTHER FEDERAL ☐
   3. STATE ☐
   4. PRIVATE ☐

B

8. CAUSE OF DAMAGE:
   1. INSECT ☐ 5. CHEMICAL ☐
   2. DISEASE ☐ 6. MECHANICAL ☐
   3. ANIMAL ☐ 7. OTHER ☐
   4. WEATHER ☐ 8. UNKNOWN ☐
9. SIZE OF TREE DAMAGED:
   1. SEEDLING ☐ 4. SAWTIMBER ☐
   2. SAPLING ☐
   3. POLE ☐ 5. OVERMATURE ☐
10. PART OF TREE DAMAGED:
    1. ROOT ☐ 5. TWIG ☐
    2. BRANCH ☐ 6. BARK ☐
    3. LEADER ☐ 7. CONE ☐
    4. TRUNK ☐ 8. FOLIAGE ☐
11. SPECIES DAMAGED:
12. NUMBER DAMAGED:
13. ACRES OF DAMAGE:
14. DAMAGE DISTRIBUTION: 1. SCATTERED ☐ 2. GROUPED ☐
18. STATUS OF DAMAGE: 1. INCREASING ☐ 2. DECREASING ☐ 3. STATIC ☐

C

16. PLANTATION ? 1. YES ☐ 2. NO ☐
17. STAND COMPOSITION (SPECIES):
18. STAND AGE AND SIZE CLASS:
19. STAND DENSITY (STEMS/ACRE):

D

19. PEST NAME (IF KNOWN), AND REMARKS (SYMPTOMS AND CONTRIBUTING FACTORS):

E

20. SAMPLE FORWARDED ? 1. YES ☐ 2. NO ☐
21. ACTION REQUESTED:
    1. YOUR INFORMATION ONLY ☐
    2. LAB IDENTIFICATION ☐
    3. FIELD EVALUATION ☐
22. REPORTER'S NAME:
23. REPORTER'S AGENCY:
24. REPORTER'S ADDRESS & PHONE NO.

II. REPLY *(For Entomologist's or Pathologist's Use)*

F

25. RESPONSE:
30. FILE NO.

G

26. REPORT NUMBER
27. SPECIMEN NO.
28. DATE:
29. SIGNATURE:

R5-5200-33

THE FOREST PEST DETECTION REPORT. The yellow original of this form is used by Federal, State, and private forest managers and concerned individuals to report forest damage caused by insects, diseases, animals, weather, chemicals, and air pollution.

THE COOPERATIVE FOREST PEST DETECTION SURVEY is sponsored by the California Forest Pest Control Action Council. Detection of damage due to insects, diseases, animals, weather, chemicals, and air pollution should be reported on the Forest Pest Detection Report, form R5-5200-33, or by card or letter. The Pest Action Council encourages Federal, State, and private land managers and individuals to contribute to the Detection Survey by submitting damage reports and samples in the following manner.

Forest Service Personnel: send detection reports through channels and mail all samples to the Regional Office -- U.S.D.A., Forest Service, Forest Pest Control Staff, 630 Sansome Street, San Francisco, California 94111.

State Personnel: send all detection reports through channels; submit insect reports and damage samples to the CDF Headquarters -- California Division of Forestry, Department of Conservation, 1416-9th Street, Sacramento, California 95814 -- and mail all other reports and samples to the Forest Service Regional Office.

Private Foresters and Individuals: send insect detection reports and damage samples to the CDF Headquarters, and all other reports and samples to the Forest Service Regional Office.

Please submit adequate damage samples illustrating the problem with each detection report. Keep samples cool and ship them immediately after collection; send samples in a screw-top mailing tube or in other suitable container.

All detection reports will be acknowledged and evaluated by specialists concerned with damage caused by forests pests.

Additional copies of the Forest Pest Detection Report form are available from local offices of the Forest Service and the California Division of Forestry.

YOUR COOPERATION WITH THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL IN ASSISTING WITH THE COOPERATIVE FOREST PEST DETECTION SURVEY IS GREATLY NEEDED AND APPRECIATED.